COURSE DESCRIPTION CARD - SYLLABUS

Course name
Semiconductors in the automotive industry [S1MiTPM1>PwPM]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of physics, electronics, materials science and vehicle construction

Course objective

Learning about semiconductor materials and their applications in the automotive industry

Course-related learning outcomes

Knowledge:
1. Students have knowledge about the types of semiconductor materials.
2. Students have knowledge about semiconductor technologies.
3. Students have knowledge of the principles of operation and applications of semiconductor materials and systems in the automotive industry.

Skills:
1. Students can describe the principle of operation of semiconductors.
2. Students are able to determine the use of semiconductors in motor vehicles.

Social competences:
1. Students are aware of the use of semiconductor materials and elements in the automotive industry and the resulting consequences for the environment, society, the development of the automotive industry and the implementation of innovative solutions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified during the final colloquium lasting at least 45 minutes. There are two completion dates to which every student is entitled. In addition, students are entitled to make-up colloqium in the make-up session. The final test includes 3-5 questions. The passing threshold is a minimum of 50% of points.

Programme content

Semiconductor materials, semiconductor systems, semiconductor manufacturing processes, properties and applications of semiconductors, in particular in the automotive industry.

Course topics

1. Band theory and basis of the operation of semiconductors and semiconductor devices.
2. Types of semiconductor materials and their properties
3. Technologies for producing semiconductor materials and systems.
4. Miniaturization and nanotechnologies in the semiconductor industry for automotive applications.
5. Applications of semiconductors in the automotive industry, global semiconductor market in relation to the automotive industry.

Teaching methods

Lecture: multimedia presentation

Bibliography

Basic:
1. V.A.W. Hillier, Fundamentals of automotive electronics, Oxford University Press 2014
2. A. Szaynok, S. Kuźmiński, Podstawy fizyki powierzchni półprzewodników, WNT 2000
3. S.M. Sze, Yiming Li, Kwok K. Ng, Physics of semiconductor devices, Wiley 2021
4. U.K. Mishra, J. Singh, Semiconductor device physics and design, Springer 2008

Additional:
1. Journals from the Elsevier group

Breakdown of average student's workload

	Hours	ECTS
Total workload	28	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	13	0,50